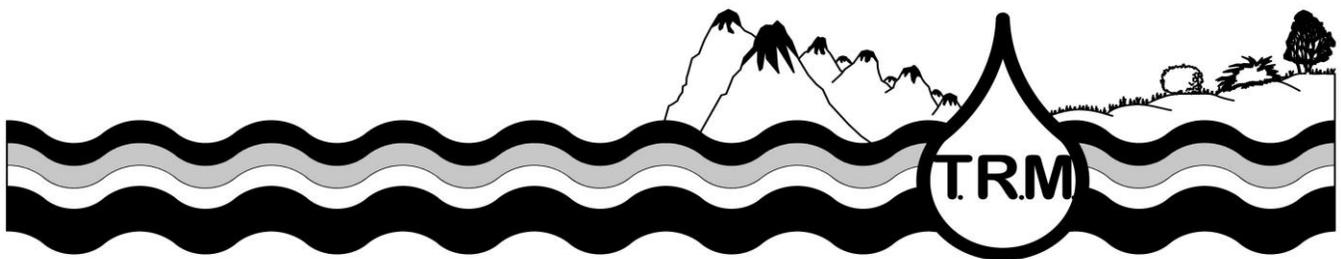




# The River Mile Water Connections

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# Total Coliform Water Impacts



<b>Subject:</b>	Water Sampling, chemistry
<b>Education Standards:</b>	
<b>Duration:</b>	3 hours
<b>Location:</b>	Assigned River Mile site
<b>Type:</b>	Ranger-Conducted
<b>When:</b>	Any site visit, preferably 1 <sup>st</sup> site visit after watershed and water cycle study
<b>Grade:</b>	3-12 <sup>th</sup>
<b>Chaperone/Student Ratio:</b>	1 adult for every 5 students minimum

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## Objectives:

Students will be able to:

- Identify whether the water and beach areas at their site indicate any possible sources of coliforms from birds, mammals, or humans
- List some potential sources of fecal coliform
- Explain what impacts that coliforms may have on water quality and human health

## Materials:

- Tape measures (25 meters or longer) - 6
- Pin flags - 3 to 6 colors
- GPS units (based on number of groups)
- Data Sheets & Clipboard - 3 to 6
- Digital Camera - 3 to 6

## Optional

- Orange cones 3-6
  - Sampling bottles
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## Pre-Visit:

- Utilize "Water Quality in the Upper Columbia River & Lake Roosevelt" Lessons 1 and 2

**Scheduling Note:**

Groups of 30 or less can all participate in the Total Coliform project and then would be divided into 3 smaller groups. If the group is larger than 60 students, half of the group will do Shoreline Assessment while half do the Total Coliform project. The Total Coliform project is at least 2 hours long and the Shoreline Assessment project is at least 2 hours long.

**Procedure:**

These locations shall be at least 50 feet apart.

Prior to your program identify 3 to 6 study areas (depending on class size with each group having 5 to 6 students). Each Study Area should include a set of transects for Riparian Buffers (see next section). Identify transects in each Study Area by a set of different colored pin flags, include Coliform Source Transects (2 to 3) and Riparian Buffer Transects (3 to 4). Place the first flag at water's edge, a second flag perpendicular to and 3 meters from water's edge, and allows, the 3<sup>rd</sup> flag perpendicular to and 10 meters from the water's edge. Each pin flag will be the starting point for a series of three (3) 50 meter long transects proceeding upriver from the pin flags.

Assign, or have each group of students, assign the following tasks to team members:

- Recorder
- GPS User
- Counters (2)
- Tape measure operator
- Photographer

Specific Tasks include:

- The GPS User takes a GPS point directly above the pin flag at water's edge and above each subsequent starting pin flag. The recorder writes these down and notes the assigned group/transect number
- The Tape Measure Operator and Recorder lay out a 25 m tape along the water's edge and are careful to NOT step in the area where the tape is laid. The Photographer takes a photo of the transect with the tape laid out for future reference. The two Counters walk along this tape noting the measurement where an indicator of bird, mammal, or human use are seen immediately touching the tape. This can include bird, mammal, or human tracks, bird and mammal scat, bird feathers, bird and mammal food items (i.e. fish bones, crayfish exoskeleton, beaver cuttings, etc.), and/or human trash, Toilet

paper sightings can be noted as evidence of human waste. The recorder writes these down. (Note: Please ensure that none of the students handle any of the fecal material). The photographer tries to get a good photo of each type of evidence (e.g. one of gull tracks, one of goose poop, one of gnawed beaver cutting, one of deer droppings, one of human tracks, etc.) to document types of impacts seen.

- The process is then repeated at the 3 meter pin flag and the tape is laid out staying perpendicular to and 3 meters from the waters edge. The Counters walk on both sides of the tape and again note any evidences touching the tape. The recorder notes the type and what the tape measurement is.
- Repeat the process at the 10 meter pin flag if time allows.
- A separate group will use a series of instruments and tool kits to also collect water quality data from the reservoir edge. See Water Quality Sampling section for list of equipment needed and tasks.

If the group is larger than 30 students, utilize additional sampling locations, Make sure there is adequate room on the beach to conduct all samples without reusing sites.

Demonstrate the procedures for the entire group with student help at the first sample location. Then each group shall make the task assignments and move to their sample location. Please make sure all groups stay well above sample locations when moving to and from their sample locations.

It is very important to minimize disturbance of the Study Area as much as possible so that class member tracks and trash are NOT counted during any of the transects. If someone is not busy with a task they should stand quietly near the water's edge and under no circumstances should they be walking through the study area, playing in the sand or throwing rocks into the water.

All data shall be written on the accompanying Coliform Water Impacts Data Collection Sheets.

Once all samples and counts have been completed the group shall return to the starting location or other location.

**Background Information:**

See Lesson 1 of "Water Quality in the Upper Columbia River & Lake Roosevelt"

Conclusion:

Lesson 6: Water Quality: Nutrient Loading & Dissolved Oxygen"

And Lesson 7: Point & Non-Point Source Pollution



# Riparian Buffer Area Assessment

<b>Subject:</b>	watersheds, shorelines, vegetation
<b>Education Standards:</b>	
<b>Duration:</b>	2 hours
<b>Location:</b>	Assigned River Mile site
<b>Type:</b>	Ranger-Conducted
<b>When:</b>	Any site visit, preferably 1 <sup>st</sup> site visit, after watershed and water cycle study
<b>Grade:</b>	3-12 <sup>th</sup>
<b>Chaperone/</b>	
<b>Student Ratio:</b>	1 adult for every 5 students minimum

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## Objectives

- 1) Determine the extent of the shoreline's riparian buffer zone between the uplands and the high water mark (1290' level) of the reservoir or high-water flood line of any reservoir tributary.
- 2) Document the types of vegetation that form the buffer zone.
- 3) Understand why riparian buffer zones are important for protecting shorelines from erosion and how they protect water quality from fertilizers, pesticides, pollution and fecal coliforms

## Vocabulary

Riparian buffer zone, water quality, shoreline protection

## Materials

- Tape measures (50 meter) - 3 to 6
- Pin flags - 3 to 6 colors
- GPS units - 3 to 6
- Clipboards and Riparian Buffer Data Sheets - 3 to 6
- Digital Camera - 3 to 6

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## Procedure:

Prior to the lesson identify each Study Area which includes both Coliform Water Impacts and Riparian Buffer transects. For the Riparian Buffer transects mark the

beginning and ending points of each transect ahead of the program with one color of pin flag (coordinated with the Coliform Water Impacts project if possible). Identify one Study Area for every 5 to 6 students. Once the team is done collecting the Coliform Water Impacts data, they will move upland to complete the Riparian Buffer Transects.

Depending on time available and the abilities of the students, set up at least four transects per study group. The transects will be perpendicular to the waters edge. Transect #1 will be at the high water level of the reservoir (1290 foot elevation) or high-water flood mark of a tributary and will be 50 meters long. The next transect will be at 3 meters, the next at 10 meters, and the final one will be at 15 meters.

Roles:

Recorder (1)

Plant ID Specialists (2)

GPS Operator (1)

Photographer (1)

Each study group starts at the lowest (closest to water) starting point identified by a pin flag (at Lake Roosevelt we start at approximately the 1290' high water mark) for their group.. The recorder takes down all information.

- The GPS operator takes a GPS recording directly over the pin flag and once again at the end of the transect (above the 50 meter mark on the tape measure).
- The Photographer takes a photo of each transect from the starting pin flag once the tape is laid out.
- The Plant ID Specialists lay out the 50 meter tape measure for the first transect, following the general high water level (1290' level) between the starting and ending pin flags. They then return to the zero mark and walk along the tape and collect the plant identification data at the level appropriate for their age group.
- One Plant ID Specialist lays a meter square or other object to identify the sample location, on each meter mark of the tape and identifies the majority plant type or species found within the sample location and the tape with assistance from the rest of the group. Depending on the student grade level and plant ID skill level this identification can be simply plant type (i.e. grass, broadleaf plant, shrub, deciduous tree or conifer), common plant names (i.e. reed canarygrass, cheatgrass, mullein, willow, pine tree), or it can be the common and scientific names of the plants, If there is no vegetation within  $\frac{1}{2}$

foot of the 1 foot mark on the tape (e.g., sandy beach, trail or dirt road), then identify what is present (e.g., sand, concrete, rock) and record it under bare ground on the data sheet).

- The second Plant ID Specialist then stands at the meter mark, looks directly up and identifies what type of tall shrub or tree is overhead. This can once again be at the level of the class and include deciduous or conifer, cottonwood, pine or elderberry, or the genus and species. This information will be used in determining the amount of buffering the tall shrubs and trees do including canopy cover and resultant underground root mass. It will help in comparing the different Study Areas and the differences that may make them better riparian buffers of upland pollutants, fertilizers, and pesticides.
- The group then repeats the process at the pin flags designating the start/end of the 3 meter, 10 meter, 15 meter, and so on, transects.
- The 50 meter tape is laid out by the Plant ID Specialists perpendicular to the high water level and in line with the start and end pin flags. The plant information is recorded at each meter marks along the tape.
- Notes can be included on impression of how good the ground cover is and whether soil erosion appears to be occurring. These transects will document the changes in types of vegetation and their densities along the shoreline.
- When done collecting data, have students collect their measuring tape and return to the start location. Leave the pin flags in place just in case there are questions and you need to return to the transect. Be sure to collect the pin flags at the end of your day.

As you have taken *GPS* readings of plant location, this data should also be entered into the NatureMapping database.

### **Sample Schedules**

#### **Morning Schedule**

9:15 AM	Arrival, Organization and Introduction
9:30	Intro to Shoreline assessment
11:15	Reports
11:30	Lunch or Departure

#### **Afternoon Schedule**

11:45	Arrival, Organization and Introduction
12:00	Intro to Shoreline assessment
1:30	Reports
1:45	Departure

### **Combined Schedule**

9:15 AM     Arrival, Organization and Introduction  
9:30         Group A: Intro to Shoreline assessment  
              Group B: Intro to Total Coliform Assessment  
11:15        Reports  
11:30        Lunch  
12:00        Introduction  
12:15        Group B: Intro to Shoreline assessment  
              Group A: Intro to total Coliform Assessment  
1:30         Reports  
1:45         Departure

### **Background Information**

See also, Lesson #7 "Water Quality in the Upper Columbia River and Lake Roosevelt"